

What is claimed is:

- 1 1. A simulated steering assembly comprising:
2 a flexible polymer steering column shaft having a fixed end and
3 a free rotational end; and
4 a control feature in communication with said free rotational end.
- 1 2. A simulated steering assembly as described in claim 1
2 wherein said control feature is a steering wheel.
- 1 3. A simulated steering assembly as described in claim 1
2 further comprising:
3 an electroactive assembly in communication with said flexible
4 polymer steering column shaft; and
5 a control module in electronic communication with said
6 electroactive assembly.
- 1 4. A simulated steering system assembly as described in
2 claim 3 wherein said electroactive assembly comprises at least one sensor.
- 1 5. A simulated steering system assembly as described in
2 claim 3 wherein said electroactive assembly comprises at least one
3 piezoceramic device.
- 1 6. A simulated steering assembly as described in claim 3
2 wherein said electroactive assembly can adjust the modulus of said flexible
3 polymer steering column shaft.
- 1 7. A simulated steering assembly as described in claim 3
2 wherein said electroactive assembly imparts road feel on said flexible polymer
3 steering column shaft.
- 1 8. A simulated steering assembly as described in claim 3
2 wherein said electroactive assembly is embedded in said flexible polymer
3 steering column shaft.

1 9. A simulated steering assembly comprising:
2 a flexible polymer steering column shaft having a fixed end and
3 a rotationally free end;
4 a steering wheel in communication with said rotationally free
5 end; and
6 an electroactive assembly in communication with said flexible
7 polymer steering column shaft.

1 10. A simulated steering assembly as described in claim 9
2 further comprising:
3 steering mechanisms; and
4 a control module in electronic communication with said
5 electroactive assembly and controlling said steering mechanisms in response to
6 signals from said electroactive assembly.

1 11. A simulated steering assembly as described in claim 9
2 wherein said electroactive assembly comprises at least one sensor.

1 12. A simulated steering assembly as described in claim 9
2 wherein said electroactive assembly comprises at least one piezoceramic device.

1 13. A simulated steering assembly as described in claim 9
2 further comprising:
3 at least one guide element in communication with said flexible
4 polymer steering column shaft and minimizing non-rotational deflections of
5 said flexible polymer steering column shaft.

1 14. A simulated steering assembly as described in claim 9
2 wherein said electroactive assembly can adjust the modulus of said flexible
3 polymer steering column shaft.
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1 15. A simulated steering assembly as described in claim 9
2 wherein said at least one sensor element senses a degree of twist of said flexible
3 polymer steering column shaft.

1 16. A simulated steering assembly as described in claim 9
2 wherein said electroactive assembly imparts road feel on said flexible polymer
3 steering column shaft.

1 17 A method of controlling a steer-by-wire assembly
2 utilizing a control feature and a flexible polymer steering column shaft having a
3 fixed end and a free rotational end comprising;

4 rotating the free rotational end in response to a driver moving
5 said control feature;

6 measuring the rotation of the flexible polymer steering column
7 shaft using an electroactive assembly in communication with said flexible
8 polymer steering column shaft; and

9 activating a steering mechanism in response to said electroactive
10 assembly.

1 18. A method as described in claim 17 further comprising:
2 adjusting the modulus of said flexible polymer steering column
3 shaft utilizing said electroactive assembly to provide feedback to said driver.

1 19. A method as described in claim 17 further comprising:
2 removing modal resonances of said flexible polymer steering
3 column shaft utilizing said electroactive assembly.

1 20. A method as described in claim 17 wherein said
2 electroactive assembly includes a solid polymer composite bundle embedded in
3 said flexible polymer steering column shaft.